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Fire Management Notes

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Fire Management Notes

An international quarterly periodical devoted to forest fire management

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Contents

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Send suggestions and articles to Chief, Forest Service (Attn: Fire Management Notes), P.O. Box 2417, U.S. Department of Agriculture, Washington, DC 20013.

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Cover: Igniting strip head fires.

Interagency Fire Disaster Drill

Gordon White

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Deschutes County in central Oregon is Oregon's fastest growing county. The urban sprawl into range- and forest land has become a concern to local fire management agencies. While much of the developed area is under joint rural fire districts and Oregon Department of Forestry protection, much of the area is adjacent to National Forest land. Through our reciprocal protection agreement with the State, we often become involved in wildland fires in these areas. County zoning ordinances require little in the way of fire protection and firefighters often find challenging situations when they arrive at a fire.

The area experienced two major, highly visible fires in and adjacent to developed areas in 1979. The fires demonstrated that coordination between agencies was a problem, and, since that time, fire protection needs have become a greater concern to the general public and local officials.

At the suggestion of a district fire management officer, the Central Oregon Fire Prevention Cooperative considered staging an interagency fire disaster drill. Under Oregon law the County Sheriff's Department of Emergency Services Section is responsible for emergency services and Search and Rescue, so this agency was the logical focal point for a disaster drill. A planning meeting was held to develop the objectives for the drill and firm up the organizations and the agencies involved. The goal of the drill was rapid interagency coordination. We felt the most important decisions would be made in the first 2 hours, and set 2 hours as the duration of the exercise. The following units agreed to participate: The American Red Cross, N.O.R.A. (the local ham radio operators club), St. Charles Medical Center and Hospital, Deschutes County Sheriff's Department, Bend Fire Department, Bend City Police, Oregon State Department of Forestry, Oregon State Police, and Deschutes National Forest.

We selected an area that would involve the maximum number of jurisdictional problems for the hypothetical fire. We also selected a week to hold the drill so it would coincide with our "Fire Awareness Week" at the start of fire season.

An umpire-director team of four experts, not associated with the drill planning group, was selected to operate the drill. They were: Dr. Robert E. Martin, Bend Silvicultural Lab, Pacific Northwest Experiment Station, USDA Forest Service, a fire behavior and tactics expert; Pete Hansen, Fire Chief, Bend Fire Department, a structural fires and coordination expert; Lt. Norm Thrasher, Deschutes County Sheriff's Department, a traffic

Representatives of various agencies discuss the outcome of the fire disaster drill.

control and evacuations expert; and Ron Bakerville, Elected Commissioner, Bend Rural Fire District (Retired USDA Forest Service Fire Training Officer, R-5 and R-6), a gaming tactics, simulation, and monitoring expert. The umpire-directors were allowed to select additional monitors as needed.

At a second meeting, the original planning team met with the umpire-directors to discuss the objectives of the drill and the general guidelines or constraints. Only the umpire-directors knew the exact time and place that the drill would take place. They planned to generate fire behavior through prepared maps and fire behavior reports, or respond to examples of good or bad fire tactics with on-the-spot adjusted fire maps and behavior. They would assess penalties such as a burned tanker or injuries for an improper tactical procedure, such as attempting to cross ahead of the fire front.

To simulate evacuation procedures residents were contacted and informed of the disaster drill. Each resident received a handout on what to do in a real emergency. Search and Rescue volunteers were to be used as injury victims, to be located by ambulance or rescue teams, transported to the hospital, admitted, and examined.

Just before the selected week, news releases were made that announced the disaster drill and gave a brief outline of its objectives. Only the umpire-directors knew the exact time of the drill. No special efforts were made to inform personnel or prepare for the drill.

On the selected day, a "tourist fire report" was relayed to the Forest Service dispatch office and a systematic dispatch of State and Forest Service personnel commenced. Upon hearing the initial fire behavior report, the Forest Service fire management officer requested that the dispatch level be raised to "extreme fire danger" class and the drill was on.

The fire was plotted to be on State protected lands, but as the Forest Service fire management officer was on the scene first, the State requested he act as fire boss until the arrival of a qualified State fire boss. He quickly identified the probability of the fire spreading into an adjacent subdivision and requested that the dispatcher notify appropriate agencies who began responding.

The Sheriff's Department command and communications bus was set up as a command post, but quickly became congested due to the volume of business.

A fire information officer was on hand to greet the news media who turned out in full force to cover the event. The fire information officer explained the objectives of the drill and the various activities that were going on.

The following week a formal critique of the drill was held at the Sheriff's Office with all participating agencies and the news media in attendance. The lead umpire-director allowed each agency a few minutes to identify problems observed or encountered. Similar items were then grouped into problem areas. Assignments were made for followup corrective actions and a four-stage plan for improving coordination was formulated. An interim Interagency Incident Management System flow chart, patterned along the lines of the National Interagency Incident Management System (NIIMS), was developed to use for the remainder of the fire season.

The consensus of the meeting was that the rural-urban interface fire problem in Deschutes County has developed to the point that common command and communication organizations are a must to handle the incidents of this nature. We are awaiting further development of the NIIMS Systems. ■

Contracting for Fire Protection on National Forests in Nevada

Richard E. Leicht

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Contracting for fire service is working well in Nevada where both National Forests are contracting for limited fire protection from the Nevada Division of Forestry (NDF). This article discusses the background, the reasons for contracting, the contract provisions, and the costs of contracting fire protection services to date.

Background

Toiyabe National Forest. Until recently personnel on the Toiyabe National Forest have been responsible for fire protection on National Forest lands (NF) and NDF personnel have been responsible for fire protection on the private lands and structures. The forest and watershed lands along the Sierra Front from Reno to Carson City are adjacent to the State capital and in a heavy center of population. The ownership of the lands is mixed, primarily NF and private.

In the early 1970's, a housing boom started on the private timber lands adjoining many of the scattered parcels of National Forest lands, and dwellings in the $150,000 to $1,500,000 range were built along the Sierra Front.

Also during the 1970's, the USDA Forest Service and the NDF began to develop more sophisticated fire forces. The Forest Service, Carson City Ranger District, concentrated their primary protection forces out of Markleville and Dog Valley, where their primary natural resource bases are, and in Carson City, to protect the scattered land parcels along the front range. The NDF buildup was concentrated from Verdi on the north to Carson City on the south, primarily where the population was growing.

During this time, while there was some coordination, both organizations had overlapping responsibilities. The overlap included fire protection, signing, patrol efforts on high risk fire danger days, fire detection with aircraft, fire planning efforts and responses to reported smoke along the front range.

The Toiyabe National Forest began to encounter problems about 1977 with personnel ceilings, high equipment charges, and inflation. In addition, the Forest Service received approximately 33,000 acres of the Redfield Estate in lieu of the estate paying Federal taxes. This increased the fire protection responsibility of the Toiyabe NF and at the same time reduced the NDF income from the private land fire base.

These factors caused both organizations to review where and how to handle fire protection the most efficient way. After many meetings, the Toiyabe and NDF agreed to the present contract arrangement with the full involvement and agreement of Aviation and Fire Management, State and Private Forestry, Fiscal and Accounting Management, and the Regional Forester.

The National Forests in Nevada.

Humboldt National Forest. The Humboldt National Forest is primarily a range forest with grass-brush vegetation. It is composed of eight separate land units located from the Idaho-Nevada border on the north to Diablo, Nev., on the south and in the eastern portion of the State.

These areas are sparsely populated and cover a large portion of the eastern portion of the State. In 1979 the Humboldt Forest began

experiencing the same personnel ceiling and equipment rental problems that the Toiyabe and other forests were experiencing.

During 1979, the NDF was also in the process of adding to their fire attack capabilities in their northern area, headquartered at Elko.

With three fire agencies located in Elko (NDF, FS, and USDI, Bureau of Land Management [BLM]), the Humboldt National Forest Supervisor was concerned about the public reaction to the duplication of services. After consultation with his staff and others, the Forest Supervisor decided to contract protection with the NDF.

The Forest had some involvement by Fiscal and Accounting Management and Cooperative Forestry and Fire for contract format, but did not consult them about the decision to contract. Aviation and Fire Management was not directly involved with the contract, but they were aware that the Humboldt was considering the contract. The Director of Aviation and Fire Management talked to the Forest Supervisor about the possibility of a three-way contract which would also involve the BLM. The Forest Supervisor, however, chose not to involve the BLM in contract considerations.

Types and Acreages of Lands Protected Under Contract. The Toiyabe National Forest contains scattered sections of timber (primarily Jeffrey pine) and brush in the lower foothills on the east slope of the Sierra Mountains between Verdi and Carson City. Presently there are 88,931 acres under contract protection.

The Humboldt is 1,081,290 acres of primarily grass/sagebrush pinyon, juniper, and some subalpine fir. No commercial timber is involved.

The State's Responsibilities in the Contract Provisions

- To provide fire protection and detection on a designated number of National Forest acres. Activity levels are described in the annual prevention-detection plan for the area which is considered a part of this agreement. (Last sentence only in Humboldt contract.)
- To make initial attack and take the designated fire management suppression action on all fires occurring on lands designated.
- To preplan and dispatch initial attack forces according to established State policies and procedures.
- To provide presuppression and suppression in accordance with current State plans which are considered a working part of this agreement.
- To bear all costs of fire suppression when they do not exceed $1,000 per individual fire.
- To send all fire reports to the FS within a designated number of days after a fire is declared out.
- To initially investigate fires, preserve evidence, and determine cause in the case of human-caused fires.
- To notify the Forest Service within 48 hours, in the case of human-caused fires, with potential claims for or against the United States and/or violation of Federal law; to enforce Nevada law related to fire prevention as a part of the presuppression job.
- To provide Forest Service dispatch office with communications equipment for dispatching capability, and to bear the cost of maintaining this equipment. (Humboldt contract only.)

The Forest Service's Responsibilities in the Contract Provisions

- To take over the command function of any fire(s) on protected lands when the Forest Service determines after consultation with the State that the fire(s) is beyond the suppression capabilities or resources of the State. To transfer the command when the Forest Service fire boss arrives on the fire. (Last sentence Humboldt contract only.)

• To provide a person to advise the State fire boss of coordination needs between fire suppression activities and attack or when the Forest Service feels circumstances warrant.

• To arrange a meeting with the State to review this agreement, make needed revisions, develop a budget and operating plan for the next fire season annually before a designated date. (May 1 in Humboldt contract; April 1 in Toiyabe contract.)

• To provide followup investigation on human-caused fires with potential claims for or against the United States and/or violations of Federal laws.

• To reimburse the State for costs for individual fires suppressed whenever individual fire suppression costs exceed $1,000. (This only applies to fires on National Forest lands.)

• To provide dispatching service to the State through Forest Service dispatch office. (Humboldt contract only.)

Mutual Responsibilities

The State and the Forest Service will mutually prepare fire prevention news releases; to coordinate legal restrictions or closures. (Humboldt contract only.)

Cost of Protection

It is difficult to compare rates with previous protection costs, especially on the Toiyabe National Forest. Before contracting with the State in 1978, the Toiyabe averaged $0.070/acre protection costs, which included air and helicopter costs. The costs on the Humboldt were not available, but we were told that the total contract costs are the same amounts as the forest received yearly for prevention and suppression (table 1).

Table 1.—*Contract rates*

Year	Forest	Acres Protected	Total Cost	Cost/ Acre
			Dollars	*Dollars*
1978	Toiyabe	86,921	40,000	0.46
1979	Toiyabe	86,921	40,000	0.46
1980	Toiyabe	88,931	45,700	0.51
1980	Humboldt	1,081,029	43,438	0.04

In 1980, the Humboldt had four fires over $1,000. These four fires burned 1,259 acres and cost the Forest Service $21,204.97 in additional suppression funds, paid for out of Fighting Forest Fires (FFF). By combining the contract cost plus the additional suppression costs, the total protection cost for 1980 was $64,642.97 or $0.06 per acre.

The Toiyabe was not billed by the State for any fires over $1,000 in FY 1980. In fact, since 1978 the 19 fires reported on Toiyabe NF all cost less than $1,000.

In 1980, of a total of 13 fires on the Humboldt National Forest only 1 covered more than 500 acres. Six fires burned less than ¼ acre, two burned less than 10 acres, and four burned less than 100 acres. In addition, NDF responded to two false alarms and eight structural fires on the Humboldt NF in 1980.

Forest Service Reasons for Contracting

Many reasons are given for contracting part of the fire load by Forest Service personnel. The major and most often mentioned reasons are:

• To avoid duplication of manpower and equipment.

• To stay within budgets, since working capital rates for fire equipment (mostly slip-on pumpers) were greater than the districts could afford.

• Limited personnel.

• Limited fuel allocations.

• Contracting of protection of isolated tracts (Toiyabe) allowed Forest Service to concentrate resources on more blocked up areas of higher natural resource value.

• The State is better able to incorporate volunteers (ranchers and other residents) into the fire prevention and suppression effort.

In reviewing these Forest Service reasons, it should be noted that the NDF does not expense out their equipment, and so, does not work under a working capital fund.

Their cost is operation and maintenance only; the State legislature appropriates replacement money. The State also has had no fuel allocations to worry about. Personnel ceilings are also present in State government, but to date have not been a problem in State fire management.

On the State side, the main reason for accepting the contract is that it strengthens the NDF suppression organization and capability. Also in order to redeem their responsibilities under State law the NDF would have fire protection, structural and wildland, in many of the same areas as the Forest Service.

General Comments

In the contracts with the field people, primarily Fire Staff Officers and District Rangers, there have been no adverse comments about contracting of fire protection services to the State. All three District Rangers contacted say they are getting better fire prevention and initial attack capabilities for the same amount of money.

The joint dispatching center, located in the NDF Northern Headquarters at East Washoe, houses the Toiyabe National Forest, NDF, and Western Nevada BLM dispatchers. This facility and arrangement makes for excellent coordination along the east slopes of the Sierras.

Contracting with the State does cause some loss of fire expertise in the Forest Service ranks, primarily on the Humboldt. Overall, this is minor. Most of the expertise is in the firefighter-crew boss category and involves seasonal personnel. The contract does not entirely eliminate Forest Service firefighters and crew bosses from getting fire experience, however, since there are usually occasions where fires escape initial attack and the forest crews are called upon.

Neither the State nor the Forest Service related any problems with the contract. Both sides feel the contract is working to their benefit. Some of the comments received concerning the contract were:

- Saved both the State and Forest Service money by avoiding duplication.
- Gained credibility with the public.
- Has given the Forest Service the opportunity to look into other areas of cooperation, i.e., interagency dispatching and warehousing.
- Brought State and Forest Service closer together as far as being supportive of each other.
- Forest Service is getting its money's worth and the State is able to utilize its personnel better.

Even though a National Forest may contract for fire prevention, presuppression and suppression, we should not lose sight that there still is a broad fire management role to be accomplished in the overall resource management scheme at the Forest level.

Questions to Consider

Contracting fire service demands much thought and lead time. Once agreement is reached, expensive equipment and personnel must be committed by the party accepting the contract. A sudden cancellation of a contract could lead to high dollar losses, personnel problems, and poor agency relationships.

Before contracting fire services in any new areas, the following questions should be considered:

- Will duplication of service be avoided?
- Does the contracting party have adequate equipment and trained personnel?
- Can response time be met and resource values be adequately protected?
- How will removal of all or part of the fire job from the organization affect other programs?
- Is the cost/benefit ratio satisfactory? This analysis must also consider intangible benefits.
- Have all affected personnel been fully informed and their opinions solicited?
- What standards need to be met?
- What will be the public reaction?
- What are the organizational effects?
- Does the proposal have needed coordination?

Contracting is a good tool when conducted properly and can benefit the parties involved. However, ill-advised or poorly planned contracts could have serious and expensive consequences. ■

Retardant Dropping in the Forest Service Northern Region

Robert C. Mock

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Dropping water and chemicals from aircraft to suppress forest and range fires is not a new idea. It dates back more than 60 years. Since that time, the technique has evolved into a sophisticated and important fire management tool.

Early Equipment and Testing

Paper bags filled with water and foam were dropped on fires in 1921. Six wooden barrels filled with water were taken aloft in 1931 in a Ford Tri-Motor in the first recorded Forest Service testing of retardant dropping. The water-filled barrels were pushed out the door of the aircraft over a test fire at Felts Field, Spokane, Wash. The immediate results were not impressive, but the tests suggested the potential of "bombing" fires.

Four years later Forest Inspector Howard R. Flint became an important figure in testing retardant dropping. Flint used Ford Tri-Motors and single-engine Travelaires to drop water in wooden containers and rubber bags attached to cargo parachutes. In another experiment, a 100-gallon tank was installed in a Ford Tri-Motor. A 30-foot cotton hose was attached to the tank with a valve for releasing water into the hose. Thirty pounds of lead was attached to the end of the hose to weight it down in the strong winds created by the forward motion of the plane. The weight proved inadequate, however, and the air blast caused the hose to collapse when it was hanging in the doorway. Force of air whipped the weighted, 30-foot hose so that it almost struck the aircraft tail assembly. Use of reinforced rubber hose did not improve the fire bombing effort. But it did permit the spraying of a light pattern of water, about 9 feet wide and ½ mile long. Experiments with a larger hose and a heavier nozzle did not improve the dropping. In the spring of 1935, Flint used condemned Army parachutes for dropping 10-gallon water containers.

Others in the Forest Service had been following Flint's early experiments and saw the potential for retardant dropping in fire suppression. Dave Godwin of the Forest Service's Washington, D.C., office was enthusiastic about the possibilities. In 1936 Godwin continued the experiments in the Northern Region using practice retardant bombs (Mark-VII).

In August of 1936, Lage Wernsted conducted a number of experiments at Winthrop, Wash. Similar experiments were conducted in the Intermountain Region, using burlap parachutes and condemned Army parachutes. That fall the test was moved to California. Water and foam solutions were used in the California experiments. The testing came to an end with the outbreak of World War II.

Post World War II Tests

In 1947, testing of retardant-dropping techniques resumed. World War II Army-Air Force aircraft were used in experiments. Two single-engine P-47 fighter planes and a B-29 bomber, christened the "Rocky Mountain Ranger," operated out of Great Falls, Mont. The P-47's were equipped with two modified wing tanks that carried 165 gallons each explosives and fuses. The modified wing tanks were designed to explode on impact, spreading the water-fire retardant mixture over a wide area. The B-29 was designed to carry eight 165-gallon bombs with proximity fuses to create an explosion above the ground. Glide bomb delivery was used in releasing the tanks from the P-47's. Precision, high-altitude bombing techniques were used in releasing the 165-gallon bomb tanks from the B-29.

The P-47's dropped tanks on practice fires and two wildfires in Montana. One wildfire was a 10-acre fire in the Deerlodge National Forest. The other was a smaller fire in the Bitterroot National Forest.

B-29 bomb tanks were dropped on controlled practice fires in the Lolo Creek area of the Lolo National Forest, just south of Missoula, Mont. The project was plagued with numerous problems. In the beginning all of the drop tanks used for the water containers

Planes like this converted B-26 wait at the ready for a fire call at the Aerial Fire Depot, Missoula, Mont.

had erratic ballistic trajectories. As a result, it was difficult to place the bomb tanks precisely on the fire. Some of the tanks did not explode. This left unexploded proximity fuses scattered about the Blue Mountain area. However, tanks dropped from the P-47's were slightly more reliable in exploding on impact and they were dropped from lower altitudes.

After 1947 the water bombing project was discontinued, and retardant dropping did not resume until 1957, when a Ford Tri-Motor was equipped with a 250-gallon tank for water-borate solutions. One hundred-gallon tanks were installed in some single-engine Stearmans, a high-wing biplane. Both the Ford and Stearman were used on wildfires in the late 1950's. While the Ford had considerable success it was slow and had a limited capacity and was retired in 1959 as an air tanker. The Stearman was even slower and carried even less. In 1958 the Grumman TBM's (a single-engine plane used by the Navy in World War II as a torpedo bomber) were fitted with 600-gallon tanks. Tests that year showed that the chemical fire retardant bentonite was superior to borate.

TBM's proved to be very effective fire bombing aircraft. In 1959 the Northern American B-25, a twin-engine World War II bomber, was added to the Northern Region's air tanker fleet. With a 1,000-gallon tanker capacity, the B-25 was a significant addition to the Region's fire bombing capability. Tests at the Edwards Air Force Base, Calif., revealed the B-25 was not designed to withstand the stress factors created in using the plane for retardant dropping. Because the aircraft could not withstand the combination of moderate turbulence and maneuvering demands associated with salvo drops of the 1,000 gallons, in 1963 the Forest Service discontinued using the B-25 for retardant dropping.

The twin-engine Grumman F-7-F fighter, used by the Navy in World War II, was adapted to carry an 800-gallon tank for use in dropping chemical fire retardant on fires. It did not prove a success. It was plagued with center of gravity, severe pitch, and control problems on salvo drops of the 800-gallon tank. The fighter was sold to an operator-contractor in the Intermountain Region. It has been used with some success in that Region.

At the time of the Sleeping Child Fire in 1961 on the Bitterroot National Forest in Montana and the Salmon National Forest in Idaho, the Northern Region brought in several air tankers for dropping retardant. The Lockheed P-V-2 (World War II, Navy, twin-engine patrol bomber) proved very successful. This plane is still in use for retardant dropping.

A tank was installed that year in the Douglas B-18 twin-engine transport-bomber. Plagued with maintenance problems, the B-18 was never popular. The following year the Army-Air Force B-26,

twin-engine bomber was adapted for fire bombing. It proved to be very effective in dropping chemical fire retardants.

A Grumman AG Cat (single-engine, biplane) was based in Helena, Mont., in 1962. But it saw very little use.

TBM's and the B-26 met the Northern Region's fire bombing needs until the 1967 fire season. That summer 1,111 fires burned more than 83,000 acres. The 1967 fire season was too great for the Region's fire bombing capacity. Flying Fortress B-17's (4-engine bomber) and Consolidated P-B-4-Y's (patrol bomber, 4 engines) were brought in to help bring some of the fires in northern Idaho and western Montana under control. They were especially effective on the Sundance and Trapper Peak Fires. The 1967 fire season established the value of large, 4-engine tankers in fire bombing. These 4-engine bombers continue to serve the Region in delivering chemical fire retardant in fire suppression.

In the spring of 1970, a B-17 was equipped with four Rolls-Royce, turbine engines. It proved to be a satisfactory fire bomber until a tragic crash claimed the lives of the owner and his copilot.

Since the '70's

In 1970, the Intermountain Forest and Range Experiment Station's Northern Forest Fire Laboratory (NFFL), Missoula, Mont., joined the Air Force in a cooperative study of retardant dropping because all branches of the military were having difficulty with suppression of fires on their practice firing ranges. A private contractor developed a tank system for use in the Air Force's C-130 transport. The NFFL and the Air Force tested the equipment at Edwards Air Force Base in California in a program called MAFFS (Modular Airborne Fire Fighting System). Five 500-gallon tanks, connected by manifolds, were installed in the C-130. Air bottles were used to provide pressure for forcing the water and chemical fire retardant out two nozzles extending from the C-130's ramp door exit. A final design was developed and tested at the Marana Air Park in Arizona in 1973. The modified design was purchased by the Forest Service and tested with the Army in Fort Rucker, Ala., and at Appalachacola, Fla. The testing established spray patterns, pressures, and altitudes for retardant dropping. The 1,500-gallon modified design was adapted to the C-H-47-C Chinook transport, using 11-inch nozzles. The MAFFS units are now available to the Air Force and Forest Service at strategic locations around the country.

The twin-engine Army C-119 and C-119-J were reliable fire bombing aircraft. In 1972 the twin-engine Lockheed Neptune P-2-V was a significant asset to the Region's air tanker fleet because of the craft's speed and larger capacity. The P-2-V had been used by

Helena National Forest retardant plant, Montana.

the U.S. Navy in World War II as a patrol bomber.

Two years later the Stol-modified B-26 bomber was a welcomed addition to the air fleet because of the airplane's capability of carrying greater loads from shorter airfields. While the Consolidated P-B-Y was available in 1975, it saw limited use. It proved quite satisfactory in retardant dropping in later years. There have been varying degrees of success with the airliner class of air tankers, the 4-engine Douglas DC-4's, DC-6's and DC-7's.

Conclusion

In the 60 years since the Northern Region Fire Management Staff first considered dropping paper bags filled with water and foam on forest fires, the technique has evolved into a sophisticated and important fire management tool. Since 1960 the Region's retardant-dropping fleet has delivered more than 14.2 million gallons of chemical fire retardant on fires. In those 21 years, air bombers have averaged more than half a million gallons (676,666) a year, ranging from the 2.9 million gallons in 1973 and 2.2 million gallons in 1967 (year of the Sundance Fire) to lows of 39,000 gallons in 1965.

Retardant dropping is now an essential tool in the Region's fire suppression arsenal. ■

Coaches and Cadre—New Concepts in Fire Suppression Training

Bonnee Turner and Dick McCoy

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The Coaching Program and the Interagency Suppression Training Cadre are two new concepts in fire suppression training that are saving dollars and time for their users.

Gaining Skills, Confidence through Experience

The Coaching Program is proving quite valuable in overhead team training. In the past, trainees observed or shadowed journeyman chiefs or officers as they performed their duties on an overhead team. The trainee seldom received any hands-on experience and the training opportunities were minimal. Limited funding is rapidly changing operational methods of dispatching both a fully qualified overhead team plus trainees to shadow these positions.

In order to meet the current needs within the monetary constraints, a Coaching Program was established in 1981. This program reverses the shadowing concept by having the trainees fully function in their respective positions with a journeyman-level chief or officer observing and assisting as needed. Not only is this method more cost effective, but the necessary skills, performance, and self-confidence levels are achieved in less time. An impressive 300 hours of actual on-the-fire training was accomplished at the chief, officer, and manager level in Oregon during 1981.

The number of coaches, function specialty, and length of coaching time largely depends on the fire's complexity and the level of trainees. One coach may assist with several different positions simultaneously, may remain for the duration of the fire, or may find the competence level high enough to require only a day or so of coaching time. In some instances when an Overhead Team-in-training is performing together for the first time, a behavioral scientist may be dispatched to coach in team building.

The Coaching Program can be used on actual fires, in team simulation exercises, or in a combination of both. This combination was proven successful with the USDI Bureau of Land Management Overhead Team development program in Oregon. Two Class II Overhead Teams were first brought together in the same field setting as Category II crews receiving initial training. Coaches assisted the teams during simulated exercises and, later, on actual project fires. An estimated $21,000 direct program cost savings and $250,000 suppression cost savings were shown during the first year of the coaching concept implementation. This same program is being used in the State of Alaska's intensive effort to field four qualified Class II and one Class I Overhead Teams in the next 5 years. This coaching concept is also being used in refresher training.

[1] Cost analysis by Arlin Smith, State Fire Management Officer, Bureau of Land Management, U.S. Department of the Interior, Oregon, unpublished staff paper, Fall, 1981.

Team Efforts in Training

The Interagency Suppression Training Cadre is a cooperative effort of Forest Service, Bureau of Land Management, Bureau of Indian Affairs field personnel, and fire training people from the Northern Training Center in Missoula, Mont., Redmond Training Center near Redmond, Oreg., and the Division of Training at Boise Interagency Fire Center. Team composition changes with each assignment to meet the needs of the users which include Federal, State, and foreign governments.

The experience of the team represents all levels of instructional and field application within the National Interagency Fire Qualification System (NIFQS) fire course curriculum. With this diversified level of expertise, the members may fill a variety of suppression positions once the primary instructional assignment has been completed.

Generally, two to eight people comprise a cadre team, depending on the complexity and type of assignment. At the time of request, the level and type of instruction needed are identified. Cadre team

members are pre-identified and can be on site within hours. The team loses little time beginning training because a support cache of equipment, materials, and supplies is always assembled.

Often adjustments and modification of materials to meet specific user needs are necessary under tight time constraints. Cadres may teach standard fire suppression courses making modifications for local emphasis or special instructional skills, such as fireline construction in tundra or bog, spike camp management, warehousing logistics, dispatching techniques, and aircraft management. Sensitivity to local environments and practices is imperative among team members to successfully meet user objectives.

Interagency Suppression Training Cadre members have instructed in university campus settings, agency headquarters, tent camps, and going project fires in Guam, Canada, Hawaii, Alaska, and other locations within the continental United States. In June 1981, an 8-person team was dispatched to Alaska where over 500 Category 11 personnel were trained for immediate fire duty. A cadre also trained local people on a ranger district in a high unemployment area and organized them into crews for local suppression work.

Conclusion

Requests for assistance are received by Agency Directors at the Boise Interagency Fire Center from governmental line officers or the State Department. Once specific needs are identified, the Interagency Suppression Cadre is mobilized or the Coaching Program is activated. The dedication of the cadre team members and coaches to these new concepts in suppression training will ensure continuing success in meeting the individual needs of requesting agencies. ■

New Ways to Use Fire-Danger Rating Now Available

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City fire department chiefs have no way of knowing when fires will occur. They must have firefighters ready to suppress fires day and night, at all times of the year. Wildland fire managers, on the other hand, have the National Fire-Danger Rating System (NFDRS) to help them predict when fires are likely to occur and, roughly, how they will behave (Deeming 1977). A computer program—FIREFAMILY—is now available to help fire managers use the NFDRS predictive tools. The program combines historical weather data recorded at a fire-weather station with the NFDRS equations to produce a number of management aids.

Once managers have analyzed the past fire weather in their protection areas, they can establish limits for future public and industrial activities, plan prescriptions for burning, and pre-position and dispatch firefighting resources.

Computer Routines

FIREFAMILY consolidates three major programs that were once separate: FIRDAT, SEASON, and FIRINF.

FIRDAT combines up to 100 years of a station's daily weather records with the NFDRS equations to produce frequency distribution tables and graphs of the NFDRS indexes and components. (Weather records are on file at the National Fire Weather Data Library at the Ft. Collins Computer Center.) In addition to other purposes, fire managers utilize these tables and graphs to determine cost-effective use of their personnel.

An innovative aspect of FIRDAT is that it allows managers to define specific dates for a fire season—especially useful, for instance, in areas that have a spring fire season that ends at green-up time and an autumn fire season that begins at leaf fall. Once managers have excluded the dates between green-up and leaf fall, FIRDAT will provide a frequency analysis for only the high-risk spring and fall periods.

SEASON uses FIRDAT data to summarize the variations in severity of fire danger during a fire season. It also reveals seasonal fire-danger patterns over many years. It will tabulate and/or graph the values of any fuel moisture, fire behavior component, or fire-danger index the fire manager wishes to analyze.

Although SEASON can provide probability tables for only one NFDRS index (or component or fuel moisture) at a time, FIRINF, using FIRDAT data, can combine two indexes. For example, fire managers often combine the ignition component (a measure of fire occurrence) with the burning index (a measure of fire intensity) to determine their adjective classes or manning levels. When FIRINF combines them, the routine prints out such frequently used management aids as the adjeetive class table. This table tells the fire manager the level of fire danger from low (L) to extreme (E). The bold outline on figure 1 highlights a weather station's very high and extreme fire-danger weather.

FIREFAMILY will also print probability tables for the two chosen variables, which show the percentage of time that the adjective levels will occur each month in the fire season. Managers can use these probability tables for both planning and budgeting purposes.

The Passing File

FIREFAMILY creates a reuseable computer file called the passing file, which contains all of a station's weather data as well as living and dead fuel moistures and the NFDRS indexes and components. It is an inexpensive and easy-to-use means to transfer information from FIRDAT to the other routines.

Once FIREFAMILY has created a passing file for a weather station, the fire manager can reuse it to combine other indexes and components to produce a number of tables and graphs. This output is useful for a variety of purposes including providing both the public and private sectors with estimates of potential fire danger. At very low cost, users can also rerun

Burning Index	Ignition Component					
	0–20	21–45	46–65	66–80	81–100	≧101
0– 7	L	L	L	M	M	
8–15	L	M	M	M	H	
16–18	M	M	H	H	V	
19–22	M	M	H	H	V	
23–25	M	M	H	H	V	
26–29	M	M	H	H	V	
30–32	M	H	V	V	E	
33–35	M	H	V	V	E	
36–42	H	V	V	E	E	
43–50	H	V	V	E	E	

The Adjective Class table combines the burning index with the ignition component. L = low, M = medium, H = high, V = very high, and E = extreme.

FIREFAMILY using the passing file with different fire season dates.

Information Available

An easy-to-understand user's guide to FIREFAMILY, written especially for fire managers, is now available. The user's guide will help fire managers code information on computer lead cards and help them analyze the output they receive. It also provides details that computer specialists need to run the program. Contact the North Central Forest Experiment Station—1992 Folwell Avenue; St. Paul, MN 55108—and ask for FIREFAMILY: Fire Planning with Historic Data by William A. Main, Robert J. Straub, and Donna M. Paananen; GTR-81.

Literature Cited

Deeming, John E.; Burgan, Robert E.; Cohen, Jack D. The national fire-danger rating system—1978. Gen. Tech. Rep. INT-39. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1977. 63 p. ■

Plastic Sheaths Reduce Danger and Wear on Firefighting Handtools

John H. Kim

Project Engineer, USDA Forest Service, Equipment Development Center, San Dimas, Calif.

Increasing costs for leather and metal sheaths for firefighting handtools has led to reduced use of sheaths, and more "makeshift" methods of covering the tools' sharp edges. Unsheathed tools expose fire crews to potential injuries, and the tools themselves to damage and dulling.

The San Dimas Equipment Center and the Experimental Technology Incentives Program of the National Bureau of Standards worked together to develop a mold for the first plastic sheath for firefighting handtools. Initial design of the Pulaski plastic sheath followed the pattern of current metal and leather sheaths. Prototype plastic sheaths were evaluated by fireline crews and, after some modifications, the General Services Administration purchased 70,000 of the sheaths and made them available for $1.50 each in 1978. The cost of plastic sheaths is considerably less (in 1978 dollars) than leather sheaths for $2.95 and metal sheaths for $4.70 each.

Once the Pulaski plastic sheaths were in production, mold development for the production of other handtool sheaths followed rapidly. In addition to the Pulaski sheath mold, the Forest Service now owns molds for production of sheaths for the double-bitted ax, brush hook, shovel, and McCleod. Plastic sheaths for the double-bitted ax should soon be available in fire caches. Production of sheaths for the brush hook, shovel, and McCleod is planned in the future.

This project has been one of our most cost-effective projects and full implementation has been rapid. Total cost for the Pulaski sheath mold was $4,900 and cost-savings benefits over the next 5 years for this sheath alone are expected to be approximately $150,000. The considerable benefits in safety and work efficiency cannot be quantified. ■

Sharp edges of the shovel, Pulaski, double-bitted ax, and brush hook covered with protective plastic sheaths.

News for Rural Fire Departments

Revolving Loan Program Improves Rural Fire Protection in Arkansas

The Arkansas Forestry Commission has a unique program that complements the Rural Community Fire Protection program begun in 1975 by the USDA Forest Service.

In 1979, the Arkansas State Legislature passed Act 36, enabling the Forestry Commission to equip and renovate Federal excess personal property vehicles for rural fire departments, to establish a revolving loan fund, and to provide other services. In 1979, $900,000 was appropriated for the first biennium and $300,000 funded for the same period. Each dollar paid back within the biennium could be reloaned up to three times. The appropriation has since been increased to $1,000,000 and funded to $700,000.

Act 36 authorized the Forestry Commission to make loans to rural fire departments not to exceed 75 percent of the cost of acquiring a piece of equipment. In no event may a loan period exceed 2 years. With these revolving funds, the Forestry Commission may purchase equipment outright such as pumps, hose, radios, and also contract with the State Correctional Department for painting, renovating, and equipping Federal excess property vehicles. A used State truck, or other trucks acquired by the Forestry Commission, may be sold after renovation outright to a fire department while Federal excess property trucks with equipment added to it are loaned to a fire department. Once such a vehicle goes out of service and is returned to the Forestry Commission for disposal, the fire department retains the added equipment which they purchased through the revolving loan program.

This revolving loan program has enabled many fire departments to obtain or upgrade fire equipment which they may not have been financially able to otherwise. ■

Robert S. Jackson
Technical Specialist,
USDA Forest Service,
Atlanta, Ga.

High-Quality, Low-Cost Equipment for Rural Departments in Florida

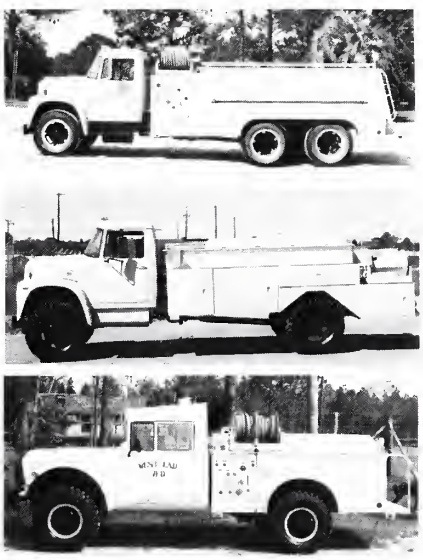
When a fire alarm sounds in rural areas of Florida, it is usually up to a volunteer fire department to respond. With the proper equipment, local fire departments can prevent many fires from becoming full-fledged conflagrations. However, the astronomical cost of traditional firefighting equipment puts it out of the range of most small community budgets. The Florida Division of Forestry has found the answer—a way to provide rural fire departments with quality firefighting vehicles at reasonable costs.

In 1964, the Florida Division of Forestry began a lend-lease program to help rural communities obtain excess government vehicles for conversion to firefighting equipment. The Division provided a vehicle and the costly and time-consuming conversion was made by individual fire departments. Division officials were pleased with the program but felt they could do more to aid small fire departments. Since 1977, plans were begun to expand their efforts into what would ultimately become the Fast Attack (FASTACK).

In cooperation with the USDA Forest Service and the Florida Department of Corrections, the Division of Forestry has now supplied

over 60 rural communities with high-quality, low-cost fire trucks. The division secured Federal and State permission to use Federal excess vehicles for conversion to fire trucks. The Department of Corrections supplies inmate labor and facilities to construct the water tanks and truck cabs, and recover the upholstery.

The Division designed three types of trucks. The FASTACK I model is a quick response vehicle with off-road capabilities and a 275-gallon tank. The FASTACK II has a 1,300-gallon tank and is equipped to aid structural responses also. The FASTACK III has a 1,000-gallon tank, auxiliary pump, and off-road capability.



Division rangers and mechanics had long modified and maintained their own equipment, and they rallied to the challenge of creating the new fire trucks. In December 1977, the first FASTACK truck was leased to the Colee Cove Volunteer Fire Department. Because of a Federal regulation which prohibits transferring the titles of Federal excess vehicles, the Division makes the trucks available to communities on a 50-year lease for the cost of conversion materials. ■

George Cooper
Rural Community Fire Protection Supervisor,
Florida Division of Forestry,
Tallahassee, Fla.

Recent Fire Publications

Alexander, M.E. Calculating spring drought code starting values in the prairie provinces and northwest territories. Canadian Forestry Service Note No. 12. Edmonton, AB: Canadian Forestry Service; 1982. 4 p.

Blakley, Aylmer D.; George, Charles W.; Johnson, Gregg M. Static testing to evaluate air tanker delivery performance. Gen. Tech. Rep. INT-78. Ogden, UT: US Department of Agriculture Forest Service, Intermountain Forest and Range Experiment Station; 1982. 17 p.

Lavdas, Leonidas G. A day/night box model for prescribed burning impact in Willamette Valley, Oregon. Journal of the Air Pollution Control Assoc. 32(1): 72–76; 1982.

Pyne, Stephen J. Fire in America: A cultural history of wildland and rural fire. Princeton, NJ: Princeton University Press; 1982. 656 p.

Radloff, David L.; Yanick, Richard F.; Walters, Kenneth G. User's guide to the national fuel appraisal process. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1982. 41 p.

Roque, Carlos. Texas volunteers prepare for air force emergencies. Firehouse 7(4):26, 68; 1982.

Thompson, T.C. Evaluation of ammonium sulfate-water retardant mixture. Forestry Note. Raleigh, NC: Division of Forest Resources; 1982. 6 p.

U.S. Fire Administration, Federal Emergency Management Agency. Master planning—Report to Congress. Washington, DC: US Fire Administration, Federal Emergency Management Agency; 1981. 40 p.

Wilcox, Fredrick; McCarty, John; Bungard, Barry. Photo series for quantifying forest residues in the northern hardwood type—oak-hickory type. NE-FR-ZZ. Bromall, PA: US Department of Agriculture Forest Service, Northeastern Forest Experiment Station; 1982. 43 p. ■

A New Book: *Fire in America*

Pyne, Stephen T. Fire in America: A Cultural History of Wildland and Rural Fire. Princeton: Princeton University Press; 1982.

Wildland fire came to the landscape of the United States from three sources, and it has assumed four general patterns. It came from nature, in the form of lightning; from Asia, at the hands of the American Indian; and from Europe, through the practices of immigrants. By itself, lightning can shape a natural fire regime. But three additional patterns have formed the fire regimes known to American history: a pattern of fire in the service of hunting and gathering; a pattern for shifting cultivation and sedentary agriculture; and a pattern for an industrialized landscape. Sometimes these patterns existed separately, but more often, they were simultaneously at work at a single site or in a geographic area. Fire history is thus inseparable from human history. The natural history of fire, for practical purposes, is indistinguishable from its cultural history. For the culture of fire, the story is told in terms of two large histories—those of fire and the American Indian and of fire and Europe—and by means of nine regional histories, which describe in detail how various fire practices came together to fashion the fire history of the United States.

Put briefly, there was an exchange of fire practices from the American Indian to the European. This was most apparent along the frontier, where early settlement often merely amplified Indian activities. As agricultural reclamation proceeded, a set of fire practices developed tied to the needs of landclearing and the cycles of crops and herds. With the spread of industrialization, however, the patterns of land use changed dramatically, mostly at the expense of reclaimed land. This counterreclamation—part of whose effects has been an increase in forest and wildlands—shaped modern fire practices. The process began by breaking the old pattern of fire use and control. But eventually it had to replace these practices with others, to develop new methods of fire control distinct from those tied to rural fire protection, to replace folk knowledge with science, traditional practice with public policy, and old fire uses with new purposes. Peculiar to these processes was the role of forestry, a form of

technology transfer from Europe, and its chief institutional manifestation, the USDA Forest Service. To explore these topics in depth, the book develops policy histories for the major Federal agencies, the States, and rural fire defense; histories of manpower, equipment development, fire prevention programs, and fire research; and, because of their significance, special histories of the light-burning controversy, the conservation movement, and the rediscovery of fire as a weapon of war.

Research for this project was supported by a cooperative agreement with the History Office of the USDA Forest Service and a Fellowship to the National Humanities Center, Research Triangle Park, N.C. ■

Remember . . . the 10 Standard Firefighting Orders

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times—observe personally, use scouts.
3. Base all actions on current and expected behavior of fire.
4. Have escape routes for everyone and make them known.
5. Post lookouts when there is possible danger.
6. Be alert, keep calm, think clearly, act decisively.
7. Maintain prompt communication with your subordinates, your boss, and adjoining forces.
8. Give clear instructions and be sure they are understood.
9. Maintain control of your subordinates at all times.
10. Fight fire aggressively but provide for safety first. ■

1981 List of Research Publications

Forest Fire and Atmospheric Sciences Research 1981 Publications is now available at no charge from the Director, FFASR, USDA Forest Service, P.O. Box 2417, Washington, DC 20013. ■

Training

National Advanced Resource Technology Center FY 1983 Schedule

Course	*Date of Presentation*
Air Quality for Federal Land Managers	December 6–10, 1982
Generalship S–520	January 31–February 11, 1983
Command S–620	February 7–11, 1983
Fire Management Analysis for Forest Planning	February 14–18, 1983
Prescribed Fire Management	February 28–March 4, 1983
LANDSPAN	March 7–11, 1983
Fire Behavior Officer S–590	March 14–25, 1983
Fire Behavior for Managers	March 14–25, 1983
Aviation Management and Safety	April 4–14, 1983
Fire & Resource Management for Line Officers & Managers—Part I	April 19–22, 1983
Fire & Resource Management for Program Managers—Part II	April 25–29, 1983

Most courses will be held at the National Advanced Resource Technology Center, Marana Air Park, Marana, Ariz. For more information, contact: Director, National Advanced Resource Technology Center, Marana Air Park, Marana, AZ 85238. Telephone FTS 762-6414 or 602-629-6414. ■

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Wisconsin Park Ranger Chad Eells is carving a Smokey Bear statue for display at McIntosh Woods State Park, Wis. Eells, a long-time wood carver, is creating this fire prevention symbol from a piece of cottonwood about 3 feet in diameter and nearly 8 feet high.